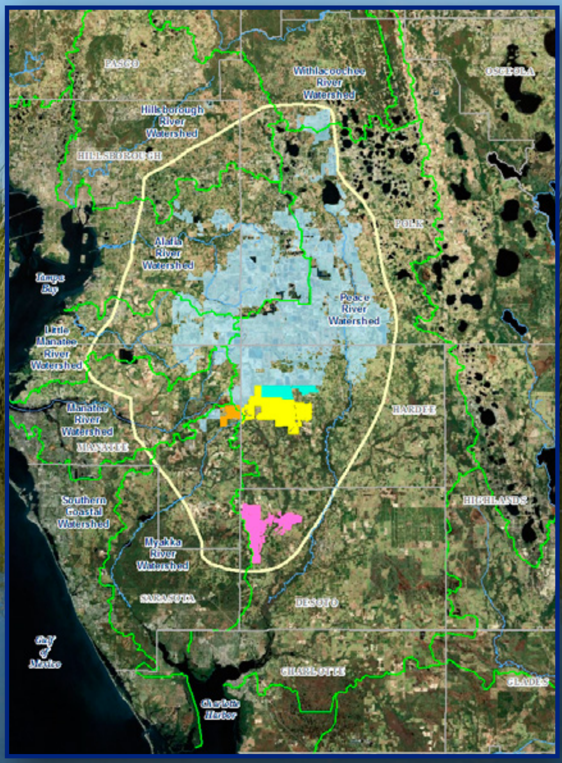
# Chapter 2
# Alternatives




# CHAPTER 2
# ALTERNATIVES

## 2.1 INTRODUCTION

The CEQ regulations implementing NEPA, 40 CFR*,* Parts 1500–1508, state that alternatives are the heart of the EIS. 33 CFR Part 325, Appendix B, sets forth the NEPA implementing procedures for the USACE regulatory program. CEQ and USACE regulations require that the federal decision maker perform the following tasks:

- Assess and objectively evaluate all reasonable alternatives, and, for alternatives that were eliminated from the detailed study, briefly discuss the reasons for their elimination.
- Disclose the potential environmental consequences of each alternative, including the No Action Alternative and the Applicants' Preferred Alternative, so that reviewers may evaluate their comparative merits.

These regulations require that all reasonable, feasible, prudent, and practicable alternatives that might accomplish the objectives of a proposed project be identified and evaluated. Therefore, in compliance with NEPA, the USACE independently identifies, reviews, and analyzes those alternatives that could achieve the purpose and need for the project. An EIS is not a USACE regulatory decision document. It is used by agency officials, in conjunction with other relevant information in a permit application file, including public and agency comments on the final EIS, to assist in making the final decision on a permit application.

Only reasonable alternatives need to be considered in detail, as specified in 40 CFR Section 1502.14(a). Reasonable alternatives are those that are feasible; such feasibility must focus on the accomplishment of the underlying purpose and need that would be satisfied by the proposed federal action (permit issuance). Those alternatives that are unavailable to the Applicants (such as mining outside the CFPD), regardless of whether they require federal action (permits), should normally be considered as part of the No Action Alternative. Such alternatives should be evaluated only to the extent necessary to allow a complete and objective evaluation of the public interest and a fully informed decision regarding the permit application.

This chapter describes the USACE process of identifying and evaluating alternatives for meeting the established purpose and need for the proposed project, which (as discussed in Chapter 1) is to extract phosphate ore from the mineral reserves in the CFPD and to construct the associated infrastructure required to extract and process the phosphate ore at separation/beneficiation facilities.

## 2.2 RANGE OF ALTERNATIVES CONSIDERED

The USACE independently examines a range of alternatives that could meet the purpose and need for the Applicants' Preferred Alternatives, as described in detail in Chapter 1. During the scoping process, input was received from multiple sources – including the Applicants, the public, cooperating and participating state and federal government agencies, and other stakeholder groups – on the range of alternatives to be considered. Based in part on these comments, the USACE identified and evaluated a range of alternatives to the Applicants' Preferred Alternatives that could meet the stated purpose and need for the projects.

The range of alternatives identified by the USACE, including alternatives preferred by the Applicants and alternatives suggested by others during the scoping period and comments to the Draft AEIS, is discussed in the following paragraphs. Review of these alternatives in this AEIS will assist the USACE in making decisions regarding current and future applications for proposed phosphate mining projects in the CFPD. The alternatives that the USACE identified based upon input from multiple sources and its independent judgment can be grouped into five major categories that follow the USACE implementing regulations on permit application decision options: that is, issue the permit, issue the permit with modifications or conditions, or deny the permit.

1. The No Action Alternative (as defined by 33 CFR Part 325, Appendix B, Paragraph 9.b.5(b)) – no construction requiring a USACE permit.
2. The Applicants' Preferred Alternative(s) (as described in their Section 404 permit applications).
3. Offsite Alternatives – alternative locations for one or more mining projects, in the CFPD, other than those preferred by the Applicants.
4. Onsite Alternatives – conceptual approaches for a mitigation framework that may be used in individual permits, such as geographic exclusion areas, to avoid or minimize impacts.
5. Functional Alternatives – mining technology alternatives that would avoid and/or minimize impacts such as alternative means of transporting rock to the beneficiation plant or alternative means of extracting the phosphate rock, and other approaches that would avoid the need for mining in the CFPD such as avoiding the use of chemical fertilizers containing phosphate and importing phosphate.

An overall summary of the alternatives reviewed for potential inclusion in the AEIS is provided in Table 2-1.

## 2.2.1 Alternatives Considered for Inclusion

The following sections provide an overview of the changes that were made between the Draft AEIS and this Final AEIS in the alternatives evaluated for inclusion. See Chapter 4 for more detailed analysis.

### 2.2.1.1 Alternatives Considered for Inclusion in the Draft AEIS

As required by the CEQ, the Draft and Final AEIS include the No Action Alternative and the four Applicants' Preferred Alternatives for more detailed analysis in Chapter 4. In the Draft AEIS, offsite alternatives that are in the CFPD mining area but different from the Applicants' Preferred Alternatives were evaluated with available information using a tiered screening process. In this screening, the

SWFWMD Florida Land Use and Cover Classification System (FLUCCS) 2010 database was used where appropriate for geographic information system (GIS) evaluation of various land use and land cover criteria. Through this process, 36 offsite alternative polygons were reduced to 17 alternatives for more detailed evaluation in Chapter 4. In addition, three polygons identified as Future Mining Areas were defined and carried forward in Chapter 4. Other alternatives considered in the Draft AEIS included alternative ore transport scenarios, dredging as an alternative to dragline excavation, importation of rock from outside the CFPD, and alternatives to using phosphate fertilizers.

**Table 2-1. Alternatives Reviewed for Consideration in the AEIS**

| Description of Alternative | Consequences of Alternative |
|---|---|
| **No Action Alternative:** | Existing permitted mining would continue, but for the four pending permit applications, there would be no construction requiring a USACE permit. |
| • Permit Denial | Denial of the permit applications for the Applicants |
| • No impacts to jurisdictional wetlands or other Waters of the U.S. | Includes modification of the Applicants' Preferred Alternatives to eliminate all discharges of dredged or fill material into Waters of the U.S. |
| **Applicants' Preferred Alternatives:** These alternatives would consist of phosphate mining as preferred by the Applicants in their four existing permit applications. | The consequences of implementing any or all of these alternatives are described in Chapter 4. |
| **Offsite Alternatives in the CFPD:** These alternatives include mining phosphate at alternative locations in the CFPD, other than the Applicants' Preferred Alternatives, that could meet the purpose and need. | The consequences of implementing any or all of these offsite alternatives are described in Chapter 4. |
| **Onsite Alternatives:** Alternative approaches for avoiding or minimizing impacts within the boundaries of any of the Applicants' Preferred Alternatives while still meeting the purpose and need. | The consequences of implementing any of these alternatives are described as part of a conceptual mitigation framework in Chapter 5. |
| **Functional Alternatives:** This approach includes using alternatives to the Applicants' proposed mining and operational methods that would avoid or minimize impacts to Waters of the U.S. through operational or technological changes or project substitutes. Alternatives considered include dredging as an alternative to dragline excavations, avoiding the use of phosphate, fertilizers, importing phosphate rock, and transporting ore by truck, rail, or conveyer, instead of by pipelines. | The consequences of implementing any of these alternatives are described in this chapter. |

The Draft AEIS also considered geographical exclusion areas in the four Applicants' Preferred Alternatives. These onsite alternatives proposed three types of buffers to protect high quality natural resources, intermittent and perennial streams, and greenways associated with the Peace River. In response to scoping comments, these buffers for each of the Applicants' Preferred Alternatives included widths of 1,500, 3,000, and 6,000 feet from intermittent and perennial streams and high quality natural resources; the latter are defined as wetlands that scored 0.7 or higher using UMAM or WRAP analyses. The actual proposed boundary of the Peace River Protection Area was also used as an exclusion area in Chapter 4 of the Draft AEIS.

#### 2.2.1.2 Alternatives Considered for Inclusion in the Final AEIS

In several areas, new or additional data were provided after the Draft AEIS had been published; these data were used in the Chapter 4 alternatives analysis for the Final AEIS. For the Tier 1 screening, updated FLUCCS data for 2010 were used to screen for areas impacted by past or ongoing mining; major highways and railroads; developed urban or residential areas, and other land uses where relevant. For the Tier 2 screening, additional information was provided on ordinances for Sarasota County and the updated FLUCCS data resulted in minor changes in acreage, primarily reduction in size, for some of the alternative polygons. The Tier 2 analysis discussion also clarified the differences between polygons that could potentially be used as stand-alone alternative mine sites compared to those parcels of land that were potential mine site extensions, using adjacent mine tracts and/or beneficiation plants within a 10-mile radius. There was also clarification that the minimum- size proposed for a mine site in the Draft AEIS of 9,000 acres was not exact and somewhat smaller parcels of 8,100 acres might reasonably be considered. The Final AEIS also acknowledges that the variability in a number of other factors not used in the screening process (for example, quality and quantity of phosphate ore and potential for providing site-specific infrastructure requirements), could make any of these parcels not viable if more detailed site-specific analyses were conducted. Such site-specific analyses are beyond the scope of this Final AEIS. The Tier 2 screening process identifies reasonable alternatives to the Applicants' Preferred Alternatives and complies with the intent of NEPA.

Another change in the Final AEIS was the inclusion of three polygons considered as foreseeable future mines (offsite alternatives) in the Draft AEIS as comparable to other polygons considered for analysis in the Tier 2 screening. Additional data provided after the Draft AEIS was published included new prospecting information for many of the polygons. These data, based upon quality and quantity of phosphate ore, resulted in eliminating additional polygons. A substantive change between the organization of the Draft AEIS and the Final AEIS was relocating all the screening process details into Appendix B. However, a summary of the process and the results of the screening steps are provided in this chapter.

In addition to the three functional alternatives considered in the Draft AEIS, this Final AEIS has added alternative means for transport of the ore from the point of extraction to the beneficiation plant. These analyses are provided as a fourth alternative in Section 2.2.6.4.

A new section has been added to the Final AEIS concerning potential use of buffers and setbacks for onsite alternatives. This chapter provides a review of the literature and the basis by which alternative buffers could be applied as part of a mitigation framework that parallels and follows the completion of the

Final AEIS. In the conceptual approach presented in this chapter, these buffers are not applied to the specific Applicants' Preferred Alternatives. However, this approach is expanded in Chapter 5, including more detail on how it could be applied in the overall USACE mitigation protocol as part of the Section 404(b)(1) evaluation.

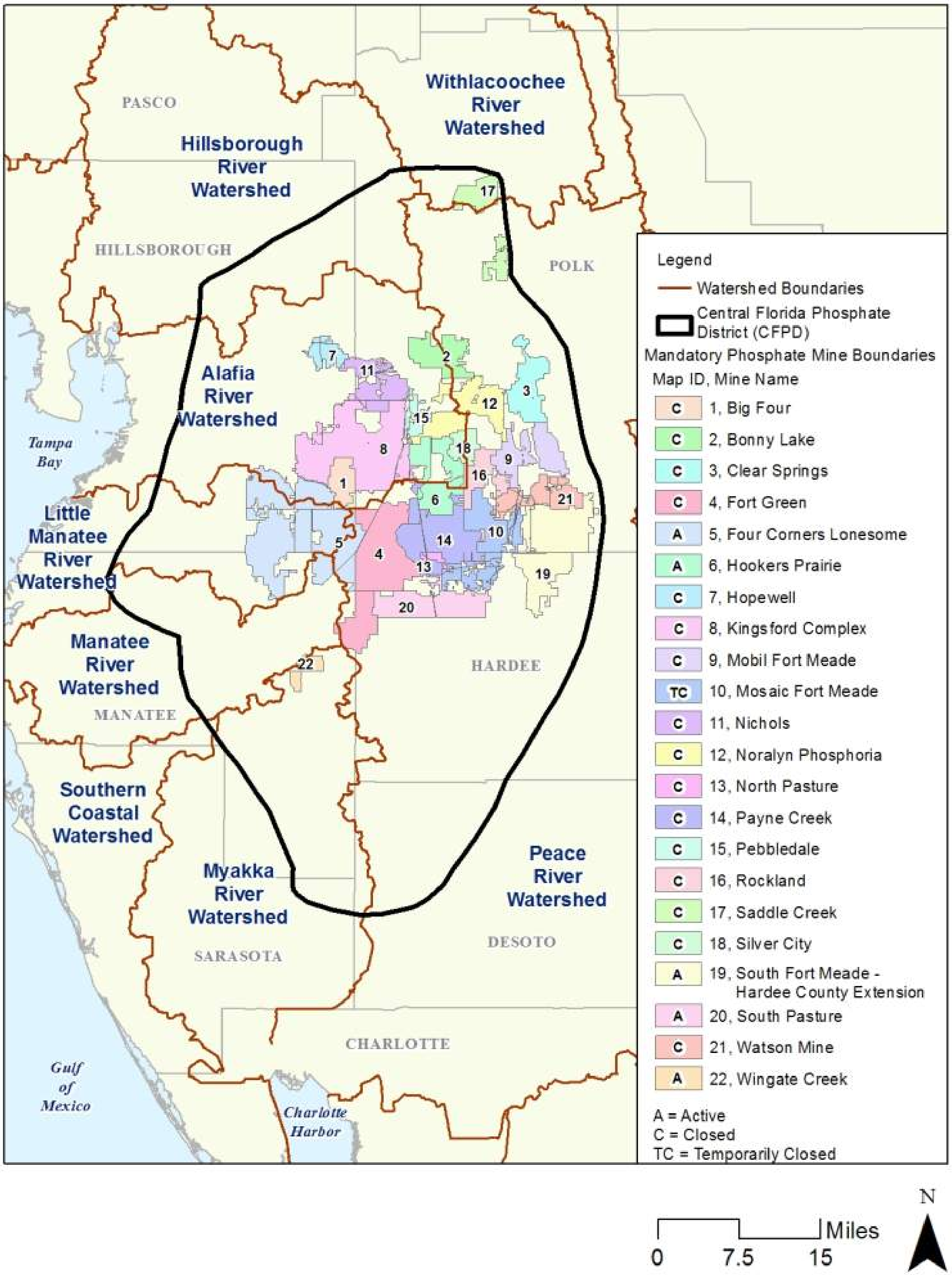
### 2.2.2 No Action Alternative

To satisfy the intent of NEPA, the USACE *"NEPA Implementation Procedures for the Regulatory Program"* (33 CFR Part 325, Appendix B), requires that the "no action" alternative is to be carried forward in the analysis of environmental consequences of the proposed action. For this AEIS, as noted above:

> "The "no-action" alternative is one which results in no construction requiring a Corps permit. It may be brought by (1) the applicant electing to modify his proposal to eliminate work under the jurisdiction of the Corps or (2) by the denial of the permit. District engineers, when evaluating this alternative, should discuss, when appropriate, the consequences of other likely uses of a project site, should the permit be denied" (33 CFR Part 325, App B).

Under the No Action Alternative, the mining that has already been authorized in the CFPD would continue as scheduled under currently approved state and federal permits. The Applicants would have the option to pursue mining that does not involve the discharge of dredged or fill material into USACE jurisdictional Waters of the U.S. The No Action Alternative will be carried forward for more detailed evaluation in the AEIS and will be identified as Alternative 1.

Figure 2-1 illustrates the currently permitted mines and closed mines in the CFPD. Currently permitted mines are those that are being actively mined, are permitted for mining, or are in some stage of reclamation. Closed mines are those for which all mining and reclamation has ceased. This figure represents the No Action Alternative, as these permitted mines will continue to operate. Table 2-2 provides a listing of these mines and their total acreages. This table does not include separate listings of small mine infill parcels (discussed in Chapter 1 and in Appendix B) permitted as minor extensions of the larger mine areas.




*Source: FDEP, 2012b; updated per personal communication with Allen (2012)*

**Figure 2-1. Alternative 1 – The No Action Alternative**

**(Currently Permitted Phosphate Mines)**

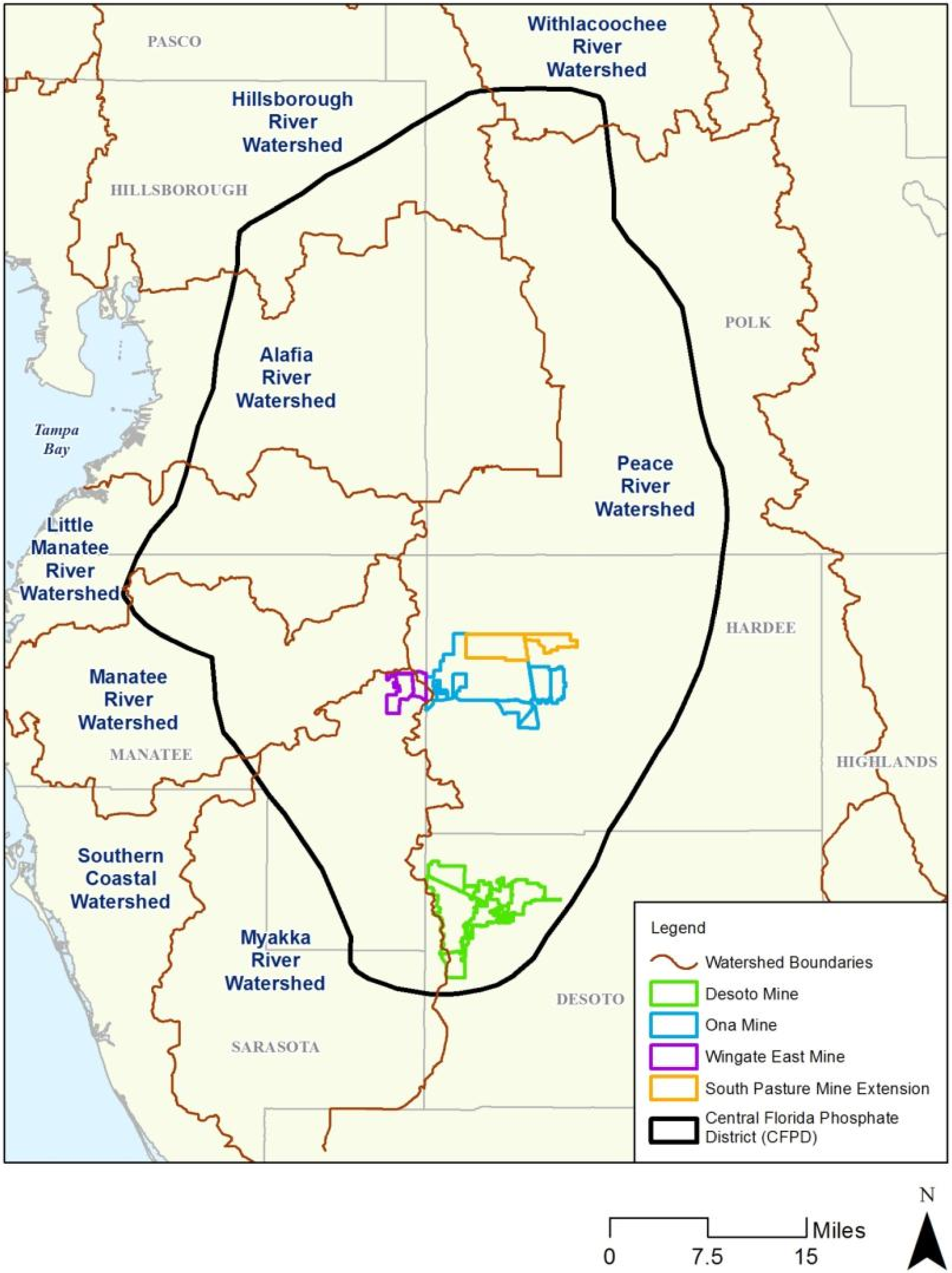
**Table 2-2. The No Action Alternative (Currently Permitted Phosphate Mines[a])**

| Mine Name/Operator[b] | Mandatory/ Non-Mandatory | % Mined[c] | Acres Mined | % Reclaimed[d] | Total Acres |
|---|---|---|---|---|---|
| Fort Green/Mosaic | Mandatory | 73 | 22,245 | 66 | 30,648 |
| | Non-Mandatory | | | | 653 |
| Four Corners Lonesome/Mosaic | Mandatory | 48 | 24,769 | 47 | 51,670 |
| Hookers Prairie/Mosaic | Mandatory | >100 | 9,214 | 71 | 8,465 |
| | Non-Mandatory | | | | 6,062 |
| Mosaic Fort Meade/Mosaic | Mandatory | 55 | 9,214 | 69 | 16,689 |
| | Non-Mandatory | | | | 1,842 |
| South Fort Meade Hardee County Extension/Mosaic | Mandatory | 56 | 10,701 | 35 | 19,158 |
| | Non-Mandatory | | | | 200 |
| South Pasture/CF Industries | Mandatory | 38 | 6,053 | 24 | 16,046 |
| Wingate Creek/Mosaic | Mandatory | 32 | 1,005 | 43 | 3,128 |

[a] The acres shown are full mine acres, many of which are already nearly depleted of phosphate and some that no longer have a beneficiation plant.
[b] This is the current company of record.
[c] % mined does not consider acres that may be preserved or not minable.
[d] % reclaimed includes reclaimed and released and reclaimed through revegetation.
Source: FDEP, 2012b, confirmed by Applicants.

### 2.2.3 The Applicants' Preferred Alternatives

The USACE is neither a proponent nor an opponent of a permit applicant's proposed project (33 CFR Part 320.1[a][4]). Therefore, in accordance with federal regulations, a permit applicant's proposal is identified in an EIS as the "applicant's preferred alternative" and not the "USACE preferred alternative." Mosaic Fertilizer and CF Industries (the Applicants) have submitted four similar applications proposing mining in the CFPD, including two new mines that would require construction of new beneficiation plants (Mosaic's Desoto and Ona Mines) and two expansions not requiring additional beneficiation plants (Mosaic's Wingate East Mine [an extension of Wingate Creek Mine] and CF Industries' South Pasture Mine Extension). Although they are similar in nature, each of these mines is considered a separate action that may have different, if overlapping, potential alternatives. The USACE has, therefore, defined the Applicants' Preferred Alternatives as the mining proposed in these four applications (see Figure 2-2). Section 1.3 of this AEIS provides a summary of each Applicants' Preferred Alternative. Table 2-3 identifies the quantity of Waters of the U.S. that would potentially be impacted by the Applicants' Preferred Alternatives relative to the total land disturbance should one or more of these alternatives be implemented. The Applicants' Preferred Alternatives are evaluated in detail in Chapter 4 of this Final AEIS and are identified as Alternative 2 (Desoto), Alternative 3 (Ona), Alternative 4 (Wingate East), and Alternative 5 (South Pasture Mine Extension).




1 **Figure 2-2. Alternatives 2 through 5 – The Applicants' Preferred Alternatives**

**Table 2-3. Waters of the U.S. Potentially Impacted by the Applicants' Preferred Alternatives**

| Mine | Total Area of the Tract (acres) | Land Area to be Disturbed (acres) | Wetlands Proposed to be Impacted (acres) | Streams Proposed to be Impacted (linear feet) |
|---|---|---|---|---|
| Desoto | 18,287 | 17,260 | 3,253 | 64,474 |
| Ona | 22,320 | 20,863 | 4,615 | 136,731 |
| Wingate East | 3,685 | 3,411 | 783 | 27,287 |
| South Pasture Mine Extension | 7,513 | 6,418 | 1,218 | 32,161 |

Source: USACE-approved Jurisdictional Determinations and proposed mine plans shown in June 1, 2012 public notices for the proposed Desoto, Ona, Wingate East, and South Pasture Mine Extension mines.

### 2.2.4 Offsite Alternatives in the CFPD

To provide a robust comparison of alternatives to those preferred by the Applicants, alternative sites in the CFPD, but at locations other than those identified by the Applicants, were identified and evaluated by the USACE. An overall process for screening and preliminary evaluation of offsite alternatives in the CFPD was conducted to select alternatives for detailed evaluation in Chapter 4 of this Final AEIS. Alternatives screening alternatives was performed to eliminate from detailed analysis those alternative locations that are clearly not reasonable, not feasible, or would otherwise not meet the purpose and need. The resulting range of offsite alternatives, in addition to the No Action Alternative and the Applicants' Preferred Alternatives, are considered in detail, as specified in 40 CFR, Section 1502.14(a), in Chapter 4.

#### 2.2.4.1 Screening Process for Offsite Alternatives Considered in the CFPD

Screening for potential offsite alternative locations in the CFPD was primarily accomplished using environmental criteria aligned with available and publicly accessible GIS data sets. To the extent the screening process identified alternatives that are clearly not feasible or reasonable, or would not meet the purpose and need, these alternatives are not considered further and the basis for this determination is documented in this chapter. If the available data do not provide information that would exclude one or more alternatives from further consideration, those alternatives are evaluated in more detail in Chapter 4. Reasonable alternatives include those that are feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the Applicants (CEQ, 1981). Such feasibility must focus on accomplishing the underlying purpose and need that would be satisfied by the proposed federal action (permit issuance). Practicable alternatives are defined in the CWA Section 404(b)(1) Guidelines as depending on cost, technical, and logistical factors in light of the overall project purpose. USACE will conduct a CWA Section 404(b)(1) analysis to determine the least environmentally damaging practicable alternative for each of the four applications in project-specific RODSOF following publication of the Final AEIS.

Phosphate mining occurs where economically mineable reserves are located. The approximate mineable limit used in the AEIS was delineated in the *Regional Study of Land Use Planning and Reclamation* (Long and Orne, 1990, Figure 2). FDEP identified this as the Conceptual Phosphate Mineable Limit, and stated in the *Regional Conceptual Plan for the Southern Phosphate District of Florida* (Cates, 1992) that it

> "…has been determined by geologic and phosphate company prospect data to be the area containing phosphate reserves which are mineable under current economic and technological restraints".

This background discussion of the CFPD area is provided in Chapter 1, Section 1.1.4; the area is shown in Figure 2-3 and is effectively equivalent to the CFPD boundary. However, phosphate reserves are heterogeneous in nature. Site-specific prospect data may identify areas that are within the conceptual mineable limits, but do not contain the phosphorus content or quality of mineable ore required to meet the overall project purpose. At the time of the Draft AEIS, the USACE did not have sufficient site-specific prospecting data to identify whether sufficient phosphate ore of the desirable quality for mining exists to meet the overall project purpose on any particular site. Some data have been made available by the Applicants for this Final AEIS and the application of these data in the screening of alternatives is discussed in Appendix B (see also Chapter 4).

The overall screening process included the following steps to facilitate identifying possible offsite alternatives:

- Step 1: Conduct Tier 1 screening to eliminate areas not available for mining.
- Step 2: Identify minimum alternative areas that would be reasonable for consideration as alternative mine sites.
- Step 3: Conduct screening for legal ordinances that preclude mining operations.
- Step 4: Identify Tier 2 criteria to be used to evaluate environmental conditions on the remaining alternatives.
- Step 5: Develop and apply decision analysis processes to prioritize Tier 2 criteria.
- Step 6: Apply Tier 2 screening criteria; complete alternative screening to evaluate and compare environmental conditions for the remaining alternatives.
- Step 7: Review for residential setbacks.
- Step 8: Apply prospecting data for each remaining alternative. This last screening step results in the final remaining reasonable offsite alternatives for more detailed analysis in Chapter 4.

These steps are discussed in Appendix B.

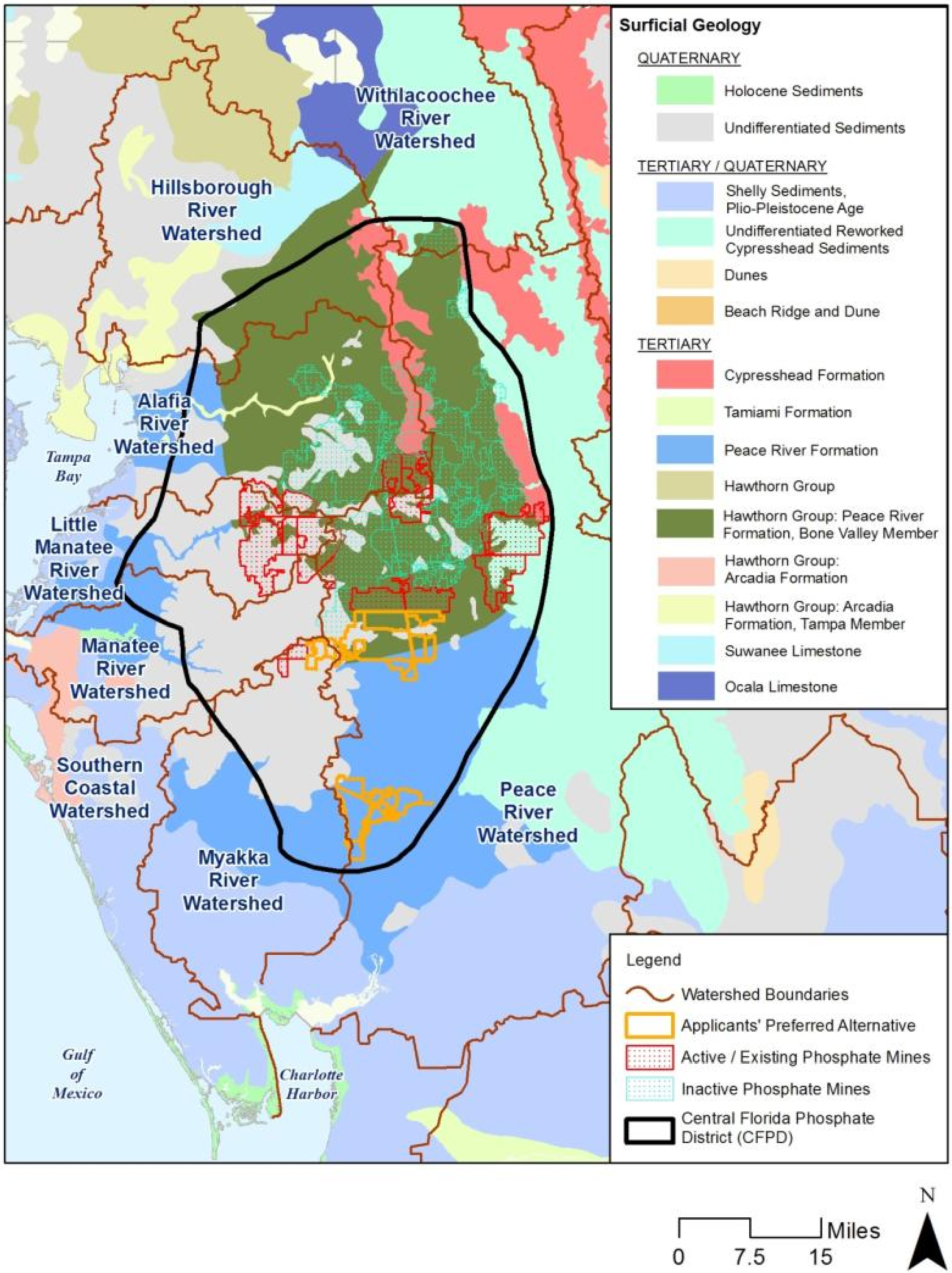



**Figure 2-3. Geological Characteristics of the CFPD**

Figure 2-4 illustrates the remaining alternatives, after Tier 1 and 2 screening, that are carried forward for more detailed analysis in Chapter 4 along with the Applicants' Preferred Alternatives and the No Action Alternative.

Tier 1 screening removed a total of 704,974 acres and Tier 2 screening removed a total of 121,658 acres. The four offsite alternatives that remain after the Tier 1 and Tier 2 screening are evaluated in more detail in Chapter 4 and are identified as Alternatives 6 through 9.

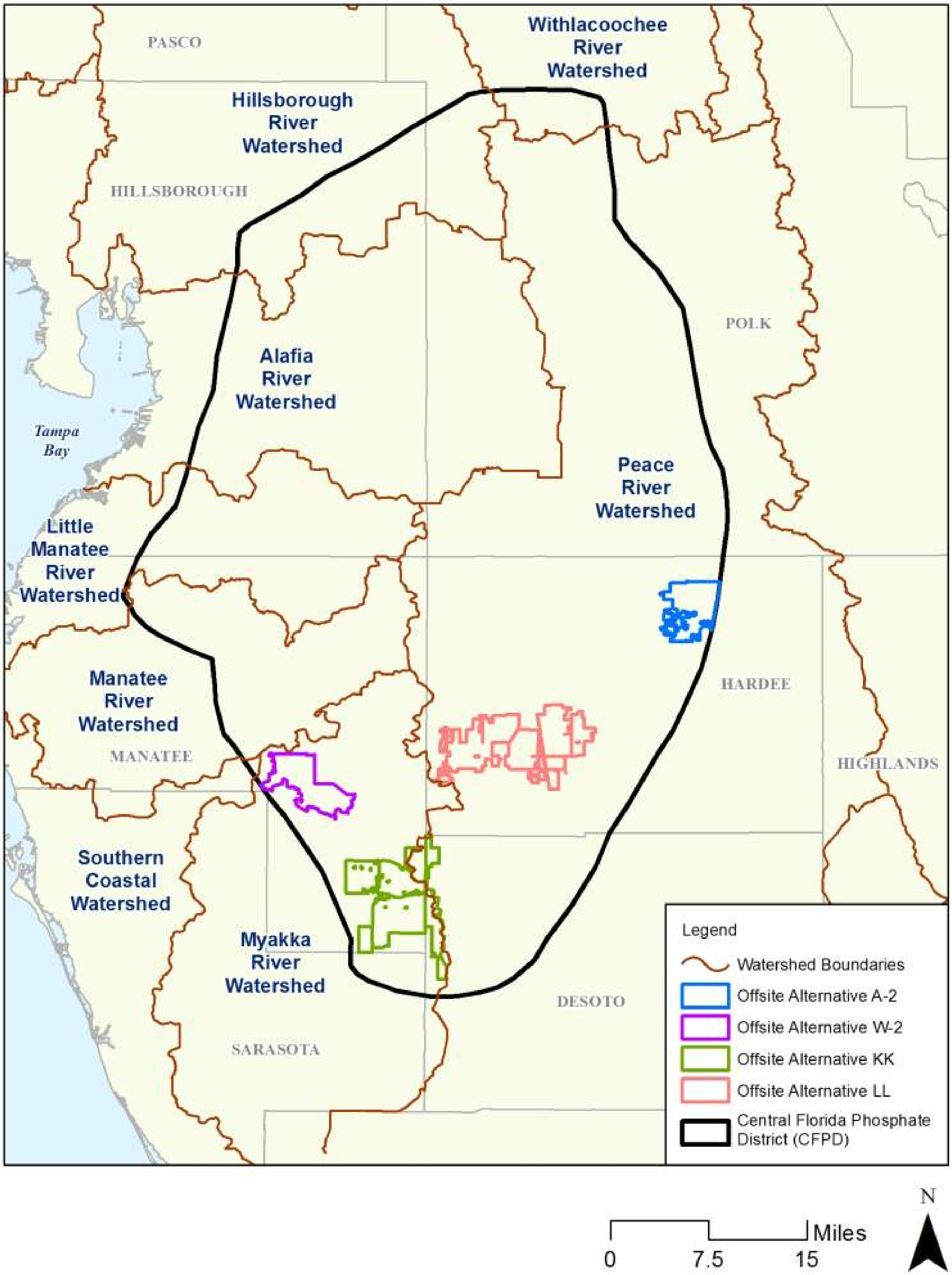
### 2.2.5 Onsite Alternatives Analysis

The Applicants, Mosaic and CF Industries, have developed as part of their mining plans mitigation proposals for avoiding areas perceived to be of high or unique value from the standpoint of natural resources or water quality or water quantity. During the scoping process, evaluation of the potential benefits of applying mining exclusion zones as buffers around major stream and river corridors and special ecological habitats was suggested; such zones would function as an onsite alternative for the Applicants' Preferred Alternatives. In response to comments received, the USACE considered other geographic exclusion alternatives to the Applicants' Preferred Alternatives using site-specific features or designated areas for avoidance and minimization of impacts. These alternatives included buffers at three different widths, 1,500 feet, 3,000 feet, and 6,000 feet, in response to public comments. The Draft AEIS also proposed to avoid the area identified as the Peace River Greenway (PRG) for each of the proposed mine locations. The result of analyses using these buffers and the PRG avoidance approach indicated areas that would effectively exclude mining in each of the proposed project locations and thereby not meet the purpose and need.

Based upon comments on the Draft AEIS, an onsite alternatives analysis was developed for consideration as in the Final AEIS. This section discusses the approach and its technical basis for the application of buffers and setbacks. Specific details on how these buffers might be applied as part of mitigation planning for each Applicants' Preferred Alternative are discussed in Chapter 5 of this AEIS. Those discussions are intended to provide information to the USACE, other agencies involved in review of proposed mine plans, and the public about the potential effects of such buffers and setbacks.

#### 2.2.5.1 Basis for Buffers and Buffer Widths

Buffers have been established for many projects in Florida and elsewhere to provide a zone of protection between a proposed activity and streams, wetlands, or other areas that may benefit from such geographic exclusions. It is generally accepted that vegetated areas adjacent to streams or other surface water bodies have a positive effect in reducing erosion, sedimentation, and loading of certain nutrients to these water bodies. In a similar fashion, vegetated buffers adjacent to natural areas of importance, such as wetlands or unique habitats, can also avoid or reduce negative effects from construction or development on the biota that occupy these natural areas.




1 **Figure 2-4. Summary of All Four Offsite Alternatives to be Carried**
2 **Forward for More Detailed Analysis**

Benefits provided vary with the resource to be protected and the type and width of buffer. By definition, a buffer is a vegetated zone between a natural resource and adjacent areas subject to human alteration (Castelle et al., 1994). While there is agreement that buffers add value in protecting important natural areas and streams, there is no consistent agreement on the appropriate size of the buffer to achieve the desired protection. Factors that influence the width of a buffer include the following:

- The location of the activity in the watershed, because buffers are more beneficial in headwater systems of small streams than along larger rivers (Castelle et al., 1994; Fischer and Fischenich, 2000; NRCS, 2010)
- The resource to be protected, such as water quality or wildlife habitat
- The prospect that cumulative impacts from multiple sources could require a larger buffer than situations where there is limited activity

Buffers that are undersized may be insufficient to provide protection, while buffers that are larger than needed may make some alternatives impractical for mining. Generally, larger buffers are necessary to protect high value wetlands and streams adjacent to intense land use changes, while smaller buffers may be appropriate in areas with fewer disturbances and/or when the natural resource is of low functional value. Buffers to protect water quality through reduction of erosion and sedimentation are generally narrow, whereas buffers with the purpose of providing protection to wetlands or other unique habitats are wider, because these buffers also provide corridors for movement of wildlife and higher habitat biodiversity.

The technical literature includes extensive data related to the appropriate widths of buffers for various purposes (Castelle et al., 1994; Fischer and Fischenich, 2000; NRCS, 2010).

Ideally, buffer widths would vary along the area of interest based on the type of resource to be protected, topography, soils, and other factors. This approach, however, while reasonable on a local basis, can be very difficult and expensive to implement in large areas. It is more typical for buffers to be standardized by a regulating agency to simplify the process for planning and enforcement.

#### 2.2.5.2 Stream Buffer Width

The buffer width to protect a stream is measured beginning at the top of the bank, or level of bankfull discharge. Based on a review of the most relevant literature, Castelle et al. (1994), Fischer and Fischenich (2000), and NRCS (2010) recommended stream buffer widths ranging from 30 feet to 150 feet, depending on conditions of the streams to be protected and the characteristics of the buffer.

Streams may be classified as ephemeral, intermittent, or perennial based on stream flow. As defined by the USACE in Part 330 of the Nationwide Permit Program (USACE, 2012):

- An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
- An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.
- A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Based on these recommendations cited above and the standard used by the NRCS, the buffer width considered appropriate for perennial or intermittent streams is 30 to 100 feet. This buffer may also be included adjacent to a stream in areas where a ditch and berm system is employed, to provide protection from the post-mining activities required to remove the ditch and berm. A graphical representation of this proposed stream buffer is provided in Figure 2-5.

#### 2.2.5.3 Ecological Resources Buffer Width

The width of vegetated buffers adjacent to natural resources of importance has varied widely in different regions of the U.S. depending upon regional conditions and the resources to be protected. Since these buffers provide multiple benefits that include protection of wildlife, habitat, and migratory corridors, selecting a width may vary that would be protective, as well as reasonable in providing mining locations that would meet the purpose and need. From the literature, the width of vegetated buffers recommended to protect natural resource areas for wildlife use and migratory corridors has varied substantially; from less than 100 feet to over 1,500 feet. (Castelle et al., 1994; Fischer and Fischenich, 2000; NRCS, 2010). Numerous studies also recommend terrestrial buffer widths of 30 meters (m) to 60 m (98 feet to 197 feet) as a means of protecting wetlands from landscape stressors (Semlitsch and Jensen, 2001). There also has been considerable discussion over the development of buffer zones that are of sufficient width to provide protection on either side of a “core habitat” where migratory species of birds, amphibians, reptiles, and mammals may migrate, as well as maintain stable populations extending as far as 400 m (1,312 feet) (Semlitsch and Bodie, 2003). With regard to studies that are representative of the southeastern U.S., the buffer widths considered adequate to maintain functional assemblages were 100 m (328 feet) for breeding birds, (Hodges and Krementz, 1996; USACE Engineer Research and Development Center

[ERDC], 2002); 135 m (442 feet) for turtles (Buhlmann, 1998); and 500 m (1,640 feet) for the complete avian community (Kilgo et al., 1998).

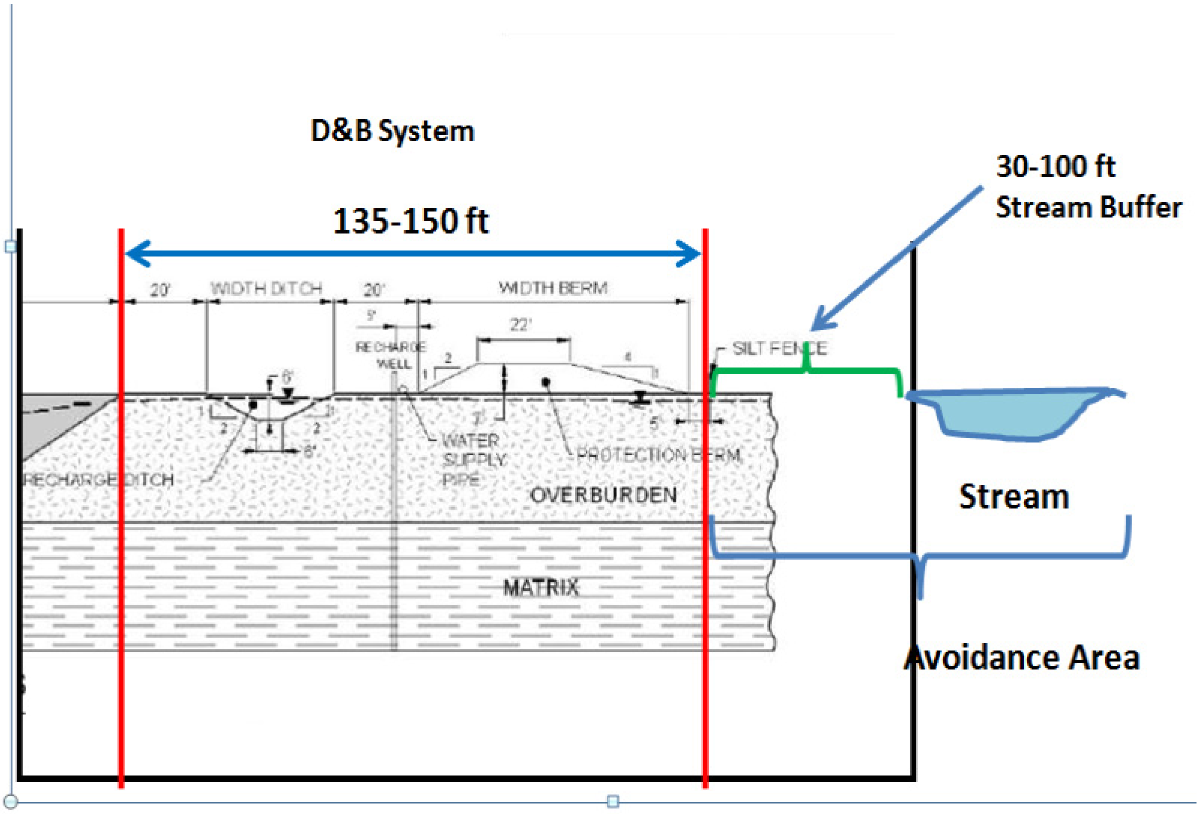



**Figure 2-5. Conceptual Drawing of Stream Buffer Illustrating Relationship to Ditch and Berm System Proposed by the Applicants**

For purposes of evaluating the reasonableness of buffers to protect important habitats and natural resources, a buffer width is considered in this Final AEIS (based on the above citations) that range from approximately 30 m (100 feet) to approximately 100 m (300 feet). Figure 2-6 illustrates how this buffer might be applied to protect wetlands that score high using UMAM or WRAP evaluations.

### 2.2.6 Functional Alternatives

Other potential alternatives to proposed mining and operational methods were proposed during the scoping period to use approaches that would avoid or minimize impacts to Waters of the U.S. through operational or technological changes or project substitutes. These alternatives include the potential to substitute dredging methods in place of dragline excavation, replacing phosphate ore with other fertilizer alternatives, or importing phosphate ore from outside the CFPD.

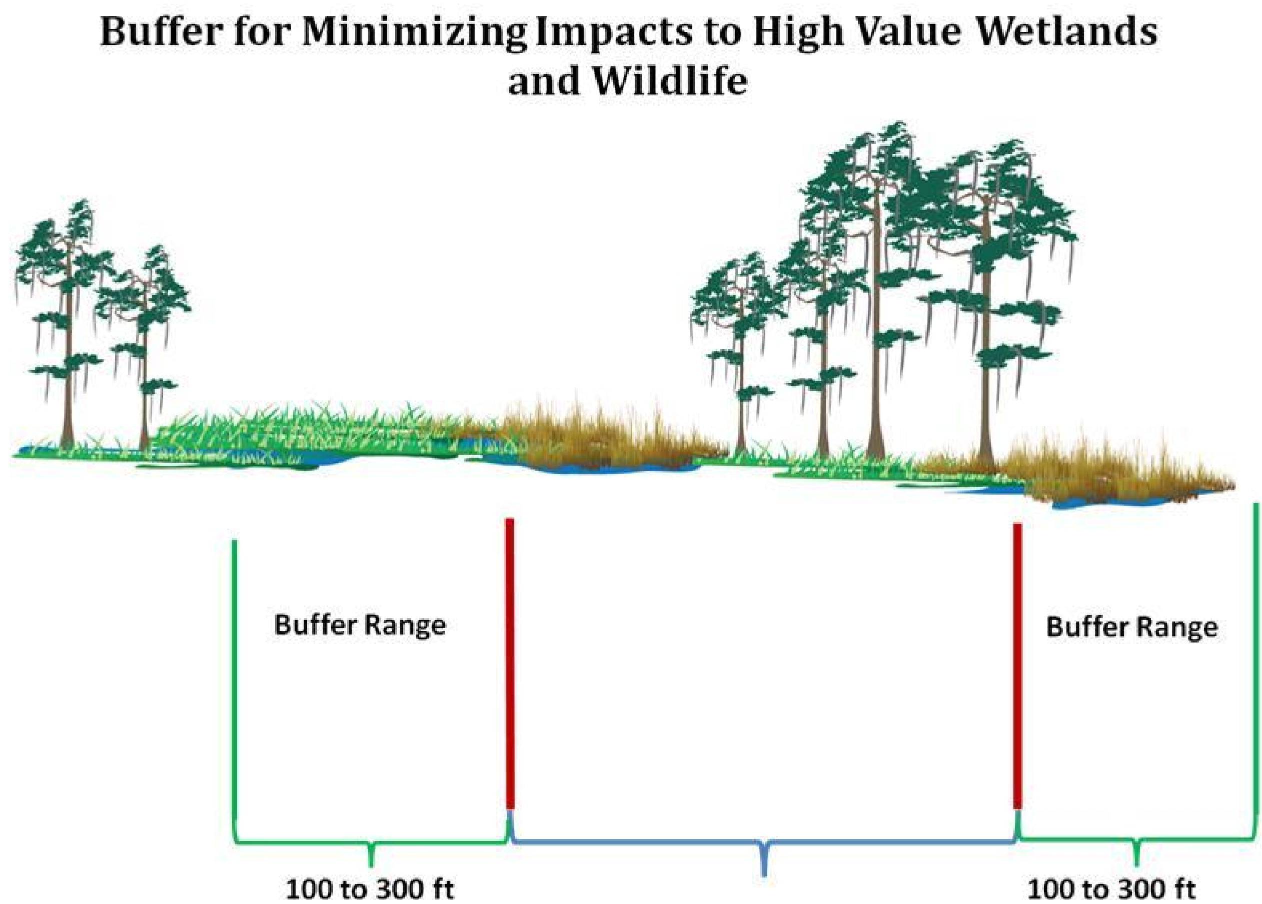



**Figure 2-6. Illustration of How Wetlands and Other Natural Areas May be Protected by Buffers**

#### 2.2.6.1 Dredging as an Alternative to Dragline Excavations

This alternative would use dredges for mining phosphate ore rather than dragline technologies. Dredging is currently applied at the Wingate Creek Mine operated by Mosaic and is proposed to be continued for part of the Wingate East Mine.

Dredges provide a means of excavating submerged overburden and matrix. A typical dredge design consists of excavating equipment mounted on a barge; this provides mobility in the area overlying the ore body (Figure 2-7). The excavating part of the dredge is generally supported on a boom at the forward end. Several spuds, or retractable anchor posts, are generally on the stern to hold the barge in a stable position and to allow pivoting.

Dredge systems dredge systems produce less efficient ore recovery, due in part to the inability to observe the matrix. Unlike dragline operations, dredging does not allow the operator to visually observe the phosphate matrix/bedrock contact. Therefore, dredging is only used in situations where the ore zone is thick, deep, and uniform. Detailed mapping of the matrix horizon is required to ensure maximum recovery and to reduce mixing of the phosphate matrix with the overburden. (The mixing would result in handling more sand and clay if the additional matrix has to be excavated.)

**Figure 2-7. Dredge-Based Phosphate Mining at the Wingate Creek Mine**

Factors affecting whether a dredging technology application would be considered reasonable and technically feasible include the following, as a minimum:

- Depth of overburden layers
- Depth to groundwater (SAS)
- Thickness of the mineable ore body
- Need to move mining operations across existing roadway, rail, or utility corridors

Dredging has been used at the Wingate Creek Mine largely due to site-specific characteristics including the depth of the mineable ore at this location. It is reported to be approximately 90 feet below land surface, making traditional groundwater dewatering difficult. Additionally, excavations to this depth from the ground surface cannot be performed using the draglines available. While dredging has been a viable alternative in cases where site-specific conditions make it economically feasible, the replacement of draglines with dredging at all mines is not a technologically feasible approach as it is frequently more costly, since more matrix has to be removed for processing; uses more energy and water, produces more sand and clays, which impact more land surface; and is less efficient. Considering the factors discussed above, the USACE has determined that this alternative is and has eliminated it from consideration.

#### 2.2.6.2 Alternatives Avoiding the Use of Phosphate Fertilizers

The USACE has determined that this alternative would not meet the project purpose and need because there are currently no feasible alternatives to the use of phosphate as a fertilizer. Extensive research has focused on alternatives to using phosphate rock and how to minimize the quantities of phosphate applied as fertilizer, including improvements in organic gardening (Soil Association, 2011), phosphorus recycling (EarthEasy, 2012), alternatives to highly soluble superphosphate (Yeates and Clarke, 1993), and multiple measures to minimize phosphate loss from ”mine to field to fork” (Cordell et al., 2009). However, the primary challenges in these alternatives include the reliability of ample phosphate in the right proportions and suitable chemical form to meet the demands of intensive agriculture carried out today in the U.S. and elsewhere. There also is an issue of distribution or redistribution if recycled phosphorus (as waste product) is considered, such that collection, storage, and transport are managed efficiently to meet agricultural needs on a specific schedule. Additionally, there is a potential risk of transmission of disease, as well as a cultural bias against reusing human or animal waste on a large scale, where material would have to be stored for extended periods and then transported from collection areas to locations for application to crops. This approach would require management of the appropriate phosphate concentrations to meet the specific needs of certain crops and soils in different regions of the U.S. Any proposals for changing the current phosphate use process to reduce loss and improve reuse are largely economic and sociopolitical decisions that are beyond the scope of this Final AEIS. Therefore, because this alternative would not meet the project purpose and need, USACE has eliminated using alternative phosphate fertilizer sources as an alternative to mining phosphate ore from in the CFPD from further consideration.

#### 2.2.6.3 Import Phosphate Rock from Outside the CFPD

The alternative of importing phosphate rock to either supplement or replace mining in the CFPD was proposed during the scoping process. The USACE has determined that this alternative would not meet the project purpose and need because of the significant logistical and cost impediments to this alternative. Equipment and operational changes would be necessary to supply the processing facilities with any substantial amount of imported phosphate rock. The most reasonable approach to importation would be to bring the rock into the Port of Tampa by ship and then transfer the rock to rail cars or trucks for transport to the processing facilities. Implementing this process would require the purchase of additional facilities and equipment at both the port and the processing facility.

Needs would include:

1. Port facility needs:
    a. Equipment and support for ship unloading
    b. Storage facilities
    c. Conveyor and dust control systems for material transfer
    d. Equipment and support for rail and truck loading

   e. Additional engineering, maintenance, and support facilities
   f. Additional staff to maintain systems
2. Transportation needs:
   a. Additional ground transportation to include railcars, power equipment, and trucks
   b. Construction and maintenance of additional mooring and staging areas for marine equipment in Tampa
   c. Additional engineering, maintenance, and support staff to operate and maintain marine equipment
3. Processing facility needs:
   a. Equipment and support for rail and truck unloading
   b. Storage facilities
   c. Conveyor and dust control systems for material transfer
   d. Reclaim system for delivering phosphate rock to processing facility
   e. Additional engineering, maintenance, and support facilities
   f. Additional staff to maintain systems

There are currently no known domestic sources to supply the phosphate rock requirements for the beneficiation plants as all phosphate rock currently mined is already being utilized. The USGS Minerals Yearbook – 2010 (USGS, 2011b) states, “There were no sales of domestic rock reported by producers.” Any reduction in mining at one location would result in the expansion of mining in other locations or the likelihood that phosphate rock would have to be purchased from foreign sources.

For example, in 2010, Mosaic was forced to reduce its production capacity at its South Fort Meade Mine due to a preliminary injunction by the U.S. District Court for the Middle District of Florida stemming from a lawsuit filed by the Sierra Club and other environmental groups. To replace lost production, Mosaic increased production at its other mines and also used imported phosphate rock from Morocco and Peru as feedstock to its Louisiana fertilizer plant, which was modified to be efficient at processing imported rock. Mosaic continues to use Florida phosphate rock for its Florida fertilizer plants.” The lawsuit was settled in February 2012 and upon court approval in March 2012 the mine was allowed to resume full production.

The primary foreign source of export phosphate rock is Morocco, with lesser supplies from Jordan, Syria, and Peru. Short-term stability of these suppliers and their representative governments may be expected; long-term stability is more questionable. Mosaic implemented importation of rock from Morocco and Peru on a limited basis to meet its short-term needs, but reduced import tons from Morocco as operations at the South Fort Meade Mine, Hardee County Extension resumed in the second quarter or 2012.

Foreign-sourced phosphate rock that could possibly be used to supply the processing facilities is chemically different from the phosphate rock being mined in the CFPD. These chemical differences, which vary from source to source, require additional or different processing steps to produce the products currently provided by the existing operations. The specific changes that would be required would be unique to each phosphate rock source, and are likely to include new steps for the removal of organic impurities and of some other constituents (e.g., arsenic).

The USACE has determined that due to the increased expense of adding and maintaining a second supply system, it would not be reasonable for the Applicants to both mine and import rock for processing simultaneously. Discontinuing mining operations and shifting solely to importation of rock does not meet the purpose and need. Including the option of importing ore at the end of any mine plan does not result in an extension of the mine plan, but rather results in a discontinuation of mining and a shift to other means of supplying the processing facility. Therefore, alternatives involving the importation of rock, in whole or in part, are not reasonable and have been eliminated from further consideration.

#### 2.2.6.4 Transportation by Rail, Truck, or Conveyer

The primary factors that make this alternative unreasonable, and therefore eliminated from consideration, are the volume of rock that must be transported per day and the increased environmental effects of the use of trucks or rail on air quality and fuel demand. Current estimates of rock mined would require the use of about 30 trucks per day between the point of extraction and the beneficiation plant, using the largest mine trucks available today at a cost of approximately $4 million each. In addition, all roads used by these trucks would have to be three times the width of the widest truck running on them and any service facilities would need to be expanded and substantially modified to support these vehicles (Mosaic, 2012). Additional driver training and a fuel depot for these trucks would also be required. There also is an improvement in the greater amount of phosphate recovered as result of the scrubbing of particles when they are transported through the slurry pipelines used to transport the ore to the beneficiation plant.

The use of rail would face similar issues in that new rail line construction would be required and trucks would still be needed to transport the ore from the mine sites to each train loading location. Trains also create additional noise and air quality issues, similar to those associated with trucks.

Likewise, conveyer belts can produce additional environmental issues, such as noise and dust, typically have high maintenance requirements, and would still likely require trucks for transport from the conveyor belt to the rail or beneficiation facility. As with trucks, neither rail nor conveyor transport provides the added benefit of pre-scrubbing of the phosphate matrix before it reaches the beneficiation plant. Therefore none of the transportation or conveyance alternatives are reasonable and will not be considered further in this AEIS.

## 2.3 ALTERNATIVES TO BE ASSESSED IN MORE DETAIL

The following alternatives will be carried forward for detailed evaluation in Chapter 4:

- **No Action Alternative**. This alternative is required by CEQ and the USACE NEPA regulations. Included in this alternative are the considerations to deny the permit, modify the proposed applications to avoid all areas of federal jurisdiction by the USACE, or to meet the need for phosphate rock through importation from other states or elsewhere in the world.
- **The Applicants' Preferred Alternatives.** These alternatives include the Applicants' Preferred Alternatives, as defined in the CWA Section 404 permit applications for the Desoto, Ona, Wingate East, and South Pasture Mine Extension projects.
- **Offsite Alternative Locations for Mining in the CFPD Other Than Those Proposed by the Applicants.** Tier 1 screening removed a total of 704,974 acres and Tier 2 screening removed a total of 121,658 acres. On the basis of the Tier 1 and Tier 2 screening results, four offsite alternatives, A-2, W-2, KK (Pioneer Tract), and LL (Pine Level/Keys Tract), will be evaluated in more detail in Chapter 4.

All alternative site locations are shown in Figure 2-8 and are summarized in Table 2-4.

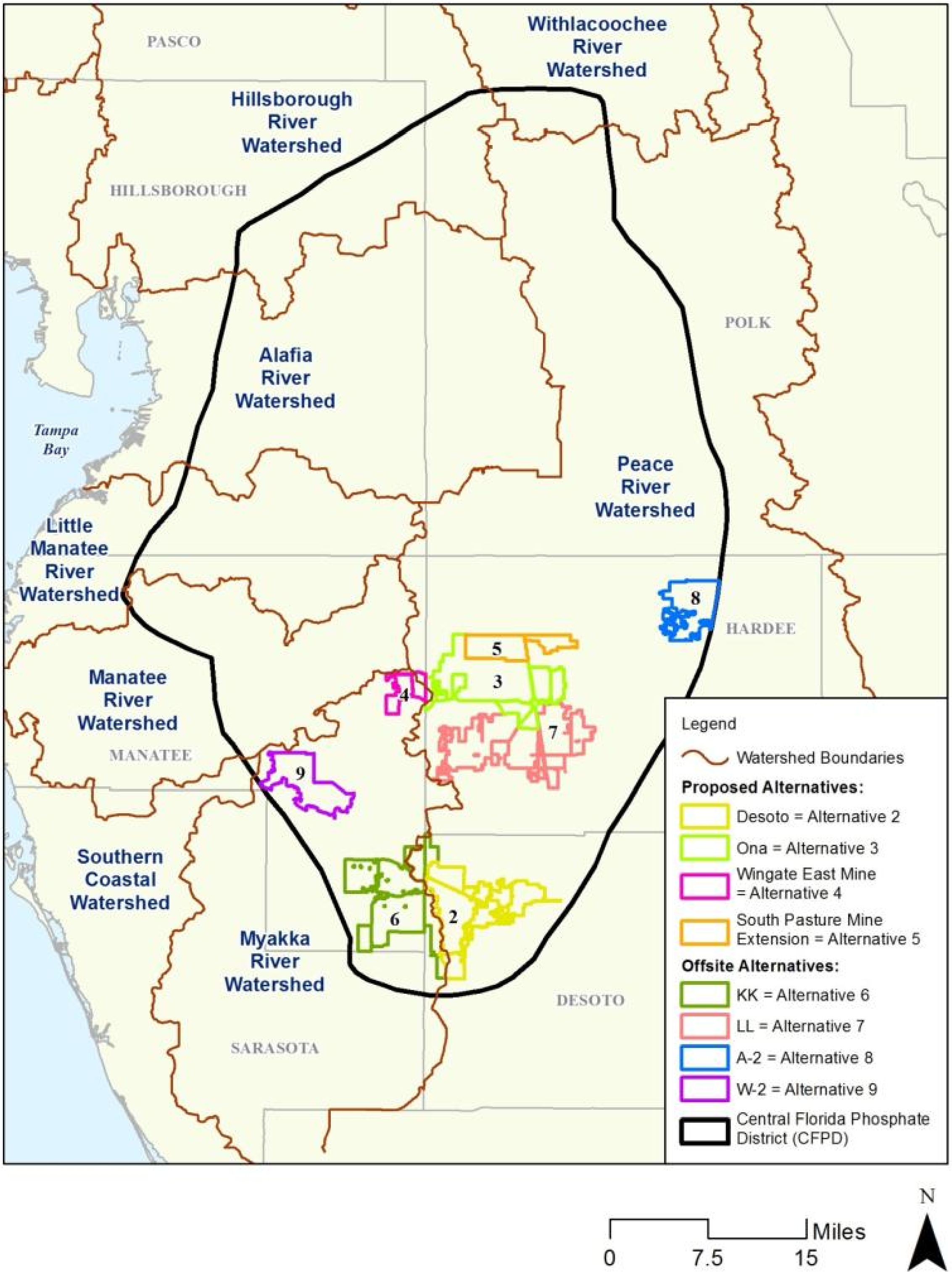



**Figure 2-8. Eight Alternatives (plus Alternative 1, No Action) to be Assessed in More Detail Including the Applicants' Preferred Alternatives**

**Table 2-4. Alternatives to be Assessed in More Detail[a]**

| Alternative Number | Site Name | Current Size | Wetland/ Hydric Soils Acreage | Forested Wetlands Acreage | Florida Forever Proposed Acreage | FEMA/ NHD Acreage | IHN Acreage |
|---|---|---|---|---|---|---|---|
| 1 | No Action | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 | Desoto Mine | 18,287 | 5,710 | 2,762 | 0 | 722 | 586 |
| 3 | Ona Mine | 22,320 | 8,773 | 3,680 | 0 | 425 | 1,716 |
| 4 | Wingate East Mine | 3,685 | 1,260 | 258 | 0 | 27 | 152 |
| 5 | South Pasture Mine Extension | 7,513 | 3,293 | 1,555 | 0 | 86 | 676 |
| 6 | Pine Level/Keys Tract (Site KK) | 24,509 | 9,270 | 2,250 | 0 | 1,646 | 1,588 |
| 7 | Pioneer Tract (Site LL) | 25,231 | 10,509 | 6,259 | 0 | 1,656 | 3,001 |
| 8 | Site A-2 | 8,189 | 1,949 | 492 | 0 | 1,114 | 183 |
| 9 | Site W-2 | 9,719 | 3,803 | 826 | 0 | 378 | 261 |
| **Average** | | **14,932** | **5,571** | **2,260** | **0** | **757** | **1,129** |
| **Max** | | **25,231** | **10,509** | **6,259** | **0** | **1,656** | **3,001** |
| **Min** | | **3,685** | **1,260** | **258** | **0** | **27** | **152** |
| **Total** | | **119,453** | **44,567** | **18,082** | **0** | **6,054** | **7,902** |

[a] Areas shown for screening criteria are based on GIS analyses and may not agree with ground-truthed data provided by Applicants and do not represent USACE-approved jurisdictional determinations.

Notes:
FEMA = Federal Emergency Management Agency
NHD = National Hydrography Dataset
IHN = Integrated Habitat Network